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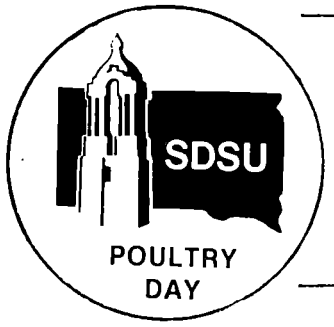

MANAGEMENT AND NUTRITION FACTORS AFFECTING EGG QUALITY

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A wide range of physical and chemical properties make up total egg quality. They include exterior quality or shell quality and interior quality such as albumen firmness, freedom from blood spots and mottled yolks. Yolk quality involves color or pigmentation. Egg size may also be associated with egg quality in some cases.

Of all the eggs produced in the United States and other countries in the world, the annual toll of egg breakage on the farm and in the processing plant has been estimated to range from 6 to 10%. Economic losses from broken or cracked eggs are very difficult to establish precisely. Some of the cracked eggs can be salvaged and pasteurized as fluid eggs. However, it is generally estimated that in the United States broken eggs cost the poultry industry about $60 million annually. The improvement to the income of the U.S. egg industry with reduced number of damaged eggs is quite impressive. For example, consider a midwest farm producing 35,000 eggs per day. The discount for cracked eggs in the midwest has varied in the last several years from about 25 to 30 cents per dozen. If the number of cracked eggs can be reduced by 1% from this typical midwest farm, the average annual income could be increased by $2,800 to $3,200 per year.

Many factors are involved in egg shell quality, not the least of which is proper nutrition of the laying hen. However, we sometimes don't look any further than this and overlook some of the management or mechanical situations that may occur on the farm that could also be involved with egg breakage. As more large egg production units go up on midwest farms, it is inevitable that mechanized equipment will handle more of the eggs. The procedures and equipment used for gathering and processing eggs by commercial egg producers and by egg processors have been shown in many studies to be very similar in design and operation, but the quality of the installation, the repair, the maintenance and the operation varied considerably from unit to unit. It has also been reported in field studies that breakage can be reduced by 1% by simple cleaning and oiling the equipment through which eggs are handled from the hen to the consumer package.

Several studies have been reported which have attempted to isolate areas along the mechanized egg handling systems where egg shells are damaged. The areas where damage to egg shell can occur include point of lay, which also includes roll out of the eggs to the egg tray or collection belt; transfer of the eggs in front of the laying cages to one collection point; washing the eggs and packaging the eggs for retail.

Research surveys have found that about 1.5% of all eggs are broken at the initial point of lay. A number of variables have been identified as contributing to shell damage at this point. These include (1) age of hen, (2) stance of the hen at time of lay, (3) feed, (4) feed system, (5) disease,

(6) design of the cage system, (7) design of the cage floor, (8) number of hens per cage and (9) number of eggs in the egg tray or on the gathering belt. One or two of these points are biological factors beyond the control of the egg producer. However, the producer has some control over the other factors, some of which are related to mechanical failure.

Researchers from California have reported on a study involving strain, flock, age, shell thickness, egg weight, make of washer, washer temperature, season and molting history of hens. In the course of the study, the researchers found that 55% of the washers had a breakage rate of 1.5% or less.

Six strains of Leghorn chickens were involved in the study. The researchers observed no significant differences in cracked or loss eggs by strain. In a relationship of egg shell breakage by strain and shell thickness, the researchers found significant difference in the amount of breakage in certain shell thickness categories. Cracked eggs also increased from .6% in a 20- to 39-week age group to 1.23% for hens 60 to 79 weeks of age.

Several different types of washers were studied in this test. However, none of the washers were shown to increase breakage significantly when compared to one another. No differences in breakage were observed due to the differences in washer water temperature. Their researchers also found no significant seasonal difference in the number of cracked eggs produced during the washing procedure. This was true even though egg shells were 5% thinner in the summer than in the winter in this study.

More breakage was observed in the molted flocks. However, this difference was not statistically significant. The egg breakage for molted flocks was 1.63% and 1.11% for non molted flocks.

The preceding information illustrates the factors other than the nutrition of the laying hen that are often involved in egg shell breakage problems. Adequate nutrition, however, is a prerequisite for production of eggs with strong shells. There are three nutrients that exert direct influence on the formation of egg shells. The first is calcium, the primary mineral of the egg shell. The second is phosphorus, the mineral that may have either a beneficial or adverse effect on egg shell formation depending on its concentration in the diet. The third is vitamin D_3.

Egg size can be affected also by factors other than dietary nutrients including the breeding of the hen, the age of the hen, and stage of sexual maturity. The most important nutrient factors known to affect egg size are protein or amino acid inadequacy of the diet and linoleic acid content. If the protein or amino acid deficiency is not severe, the size of the egg is reduced rather than a decrease in egg production. A linoleic acid deficiency can cause a sizable reduction in egg size to the point where a producer would obtain many more medium eggs than large eggs. Under practical conditions, linoleic acid content may be low in diets based primarily on barley, wheat or milo as grain sources.

Interior quality or albumen quality of eggs is dependent on the firmness of the albumen. One dietary factor that may be involved with albumen quality is the element vanadium. Vanadium is found in varying concentrations in phosphate feedstuffs. At certain concentrations in the feed, vanadium can decrease albumen quality and, as it becomes present in higher concentrations, it will cause a reduction in egg production.

IMPOSSIBLE CHICKEN PIE

Mrs. June Herke
Howard, South Dakota

1 broiler-fryer chicken, cut in parts
2 cups water
2 teaspoons salt, divided
1 cup shredded Mozzarella cheese, divided
1 can (6 oz.) tomato paste
1 teaspoon oregano leaves
½ teaspoon basil leaves
½ cup small curd cottage cheese
2/3 cup prepared biscuit mix
1 cup milk
2 eggs
¼ teaspoon pepper

In deep saucepan, place chicken. Add water and 1 teaspoon of the salt. Cover and simmer about 45 minutes or until fork can be inserted in chicken with ease. Cool. Separate meat from bones. Discard bones and skin. Cut chicken in bite-size pieces and place in large bowl; add ½ cup of the Mozzarella cheese, tomato paste, oregano and basil; stir to mix and set aside. In a lightly greased large quiche dish or deep-dish pie pan, place cottage cheese and spread evenly. Place chicken mixture evenly over cottage cheese. In bowl, place biscuit mix, milk, eggs, pepper and remaining 1 teaspoon salt; beat 1 minute with hand mixer. Pour over chicken mixture. Bake in 350 degree F. oven about 30 minutes or until brown and a knife inserted in middle comes out clean. Remove from oven and sprinkle with the remaining ½ cup of Mozzarella cheese. Let set 5 minutes before serving. Makes 4 servings.